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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,678	04/28/2006	Leena Lehtinen	OUTT 3463	8503
7812 7590 11/12/2008 SMITH-HILL AND BEDELL, P.C. 16100 NW CORNELL ROAD, SUITE 220 BEAVERTON, OR 97006				
EXAMINER				
WALCK, BRIAN D				
ART UNIT		PAPER NUMBER		
4181				
MAIL DATE		DELIVERY MODE		
11/12/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/577,678

**Applicant(s)**

LEHTINEN ET AL.

**Examiner**

Brian Walck

**Art Unit**

4181

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 4/28/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/28/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CIS)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 11/28/2006

**DETAILED ACTION**

***Election/Restrictions***

1. A call was made to John Smith Hill on 22 September 2008 regarding a restriction for the instant application. On further consideration, examiner has decided that restriction for the instant application is not proper and all claims will be examined.

***Specification***

2. The disclosure is objected to because the fifth paragraph of page 3 states, "US patent 4,004,174 describes the removal of chloride from a zinc sulphate solution." US patent 4,004,174 to Hideo Yashiro titled "Rotary anode target for X-ray tube with tungsten target layer on substrate of molybdenum alloyed with titanium or zirconium" does not describe the removal of chloride from a zinc sulphate solution.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

***112 1st***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1-28 disclose the limitation of "other selective solid separation material." Paragraph 1, page 5 of the instant specification states that "Selective solid separating material usually means the type of materials that act and are used like ion exchangers, which do not literally take ions out of the solution and replace them with others, but instead the separating material may be selective for instance to some acid or salt. Thus the separating material may take sulphuric acid or copper sulphate for example out of the solution. Since the distinction between ion exchanger and selective separating material is at present unclear, the term ion exchanger will be used hereafter to refer to both groups." Despite this, the instant specification does not disclose examples of what the "other selective solid separation material" might specifically be, nor does it disclose how it would be used in the scope of the invention. Examiner suggests that applicant omit all occurrences of "other selective solid separation material" from the claims.

**112 2<sup>nd</sup>**

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Regarding claims 1-28, the phrase "characterized in that" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Examiner suggests changing all instances of "characterized in that" to "wherein."

8. In addition, claim 1 recites the limitation "the next stage of solution purification."

There is insufficient antecedent basis for this limitation in the claim. Furthermore, this limitation is carried on to claims 2-17 as they are dependent on claim 1.

9. In addition, claim 18 recites the limitation "the following stage of solution purification." There is insufficient antecedent basis for this limitation in the claim.

Furthermore, this limitation is carried on to claims 19-28 as they are dependent on claim 18.

10. In addition, claims 3 and 18 recite the limitation "the ion exchange step." There is insufficient antecedent basis for this limitation in the claim. Furthermore, this limitation is carried on to claims 6-9, 19-28 as they are dependent on claims 3 and 18.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**13. Claims 1, 4, 10-11,13-14, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,355,009 to Stewart (hereinafter referred to as Stewart) in view of WO 01/34856 A1 to Jay et al (hereinafter referred to as Jay).**

Regarding claims 1, 10, 11, Stewart teaches a method for separating copper and chloride from a zinc sulfate solution, the chloride removal accomplished by precipitation of cuprous chloride and the copper removal accomplished by cementation with zinc. (see abstract). Stewart does not teach the use of an ion exchanger with a polymeric amine (specifically polyethylene imine) as the functional group for separation of copper from the zinc sulfate solution.

Jay teaches the use of a chelating polymeric material to remove metal species from a solution (see abstract). Jay also discloses that "certain macrocyclic ligands, crown ethers and other crypands are able to capture targeted metal ions... for example copper, and may be advantageously used to recover this metal ion from solution, particularly in... applications where the recovery of the copper metal ion from... aqueous solutions is desired" (Page 4 lines 20-25) and more specifically that "polyethyleneimine-based polymers (PEI) have been proposed for the displacement of copper and other metals" (page 6 lines 21-22). Jay additionally discloses that "the macryocyclic ligands... may be bonded to a silica... substrate."

It would have been obvious to one of ordinary skill of the art at the time of invention to use the polyethyleneimine based ion exchanger disclosed in Jay in the copper removal stage of Stewart. The motivation for doing so is that ion exchange is a substitutable equivalent to cementation with zinc for removing copper from a zinc sulfate

solution, as evidenced by AU 536376 to Chapman et al (hereinafter referred to as Chapman), which discloses a method comprising "Treatment of [zinc sulphate] solution to precipitate copper using at least one procedure drawn from the group consisting of cementation with zinc dust... and ion exchange" (claim 1).

Regarding claim 4, Stewart discloses that "300 grams of the white dust sample material were leached in 1 liter of sulfuric acid solution" (column 3, lines 7-9) wherein the white dust contains 52% zinc oxide (column 2, line 38) and 95% of the zinc was dissolved (column 3, line 13). This means that the zinc concentration of the raw solution would be about 119 g/l, which is within the range of 30-200 g/l.

Regarding claim 13, Stewart discloses that the leach solution had "a final pH of about 2" (column 3, line 12) before chloride removal, which is within the range of 1.5-3.9.

Regarding claim 14, Stewart discloses that "[i]t is preferred that the source of cupric ions [for precipitation of chlorine as copper chloride] be... cupric oxide" (column 3, lines 51-53)

Regarding claim 17, Stewart discloses that "it is preferred that the residual cupric concentration [after chloride removal and before copper removal] be at least about 0.5 g/l, more preferably about 0.5-5.0 g/l" (column 3, lines 38-39).

**14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay as applied to claims 1, 4, 10-11, 13-14, 17 above, and further in view of US 4943375 to Bradshaw et al. (hereinafter referred to as Bradshaw).**

Stewart in view of Jay fails to teach the use of an ion exchanging material with an alkyl-silylated silica base. Bradshaw teaches a "process of separating a selected ion from a plurality of other ions in a multiple ion solution" (see title) by using an ion exchanger which consists of a polymeric amine attached to an alkyl-silylated silica base (see the first figure of the abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention to use the ion exchanger with the alkyl-silylated silica base disclosed in Bradshaw in the copper removal stage of the process disclosed in Stewart. The motivation for doing so is that ion exchange is a substitutable equivalent to cementation with zinc for removing copper from a zinc sulfate solution, as evidenced by Chapman (see above).

**15. Claims 3, 6, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay and Bradshaw as applied to claim 2 above, and further in view of Fischer et al ("Silica-Polyamine Composite Materials...efficiency" hereinafter referred to as Fischer) and DD 9604 to Wolf et al (hereinafter referred to as Wolf, note that examiner reviewed the German language patent with the aid of an oral translator, an English language translation of the patent will be sent out at a later date).**

Although Jay teaches copper removal, regeneration of the ion exchanger and separation of copper from the regeneration solution (page 10, line 25 to page 11, line 6), Stewart in view of Jay and Bradshaw fail to teach an alkaline pretreatment of the ion exchanger or treatment with copper free zinc sulfate solution.



Regarding the alkaline pretreatment of claim 3, Fischer teaches pretreating a polyamine-silica ion exchanger with NaOH to improve the metal ion binding ability of the ion exchanger (page 3130, first paragraph). Fischer also discloses that copper specifically is intended to be removed using the ion exchanger (see abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention to include the additional step of pretreating the polyamine-silica ion exchanger with NaOH as taught by Fischer in order to improve the copper ion binding ability of the process taught by Stewart modified by Jay and Bradshaw.

Regarding the copper-free zinc sulphate solution treatment of claim 3, Wolf teaches a process of removing iron from a zinc sulfate solution using an ion exchanger, wherein the ion exchanger is washed with uncontaminated 4 N zinc sulfate solution in order to charge the ion exchanger with zinc ions to improve the ion exchange process (page 2, lines 54-64).

It would have been obvious to one of ordinary skill in the art at the time of invention to include the additional step of washing the ion exchanger with uncontaminated zinc sulfate solution as taught by Wolf in the process taught by Stewart modified by Jay, Bradshaw, and Fischer. Iron is a transition metal similar to copper and would behave in a similar manner to copper with regards to ion exchangers, therefore the motivation for adding in this step would be that it would improve the ion exchange process.

Regarding claim 6, the copper free zinc sulfate solution taught by Wolf would have a pH of at least 2 as it is not strongly acidic.

Regarding claim 9, Jay teaches that "the metal ions can... be recovered by methods such as precipitation, cementation, electrowinning, or other method well known to those in the gold industry" (Page 19, lines 25-27). Sulfide precipitation is a precipitation method well know to those in the gold industry.

**16. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay as applied to claims 1, 4, 10-11, 13-14, 17 above, and further in view of US 3682589 to Moore et al (hereinafter referred to as Moore).**

Neither Stewart nor Jay teach the copper content of the raw solution routed to copper removal to be in the range of 100-2000 mg/l.

Moore teaches the use of an ion exchange sorbent to remove copper from a zinc sulfate solution (column 2 lines 66-72) wherein the copper content of the raw solution is 0.46 g/l (column 4 line 16), which is to say 460 mg/l.

It would have been obvious to one of ordinary skill in the art at the time of invention to use a raw solution with a copper content of 460 mg/l as taught by Moore in the process of Stewart modified by Jay. The motivation for doing so would be that it would produce the same predictable result as the process taught by Stewart Modified by Jay, specifically removal of copper from zinc sulfate.

**17. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay, Wolf, and Fischer as applied to claims 3, 6, 9 above, and further in view of Moore.**

Neither Stewart, Jay, Wolf, nor Fischer teach that the copper removal with ion exchanger occurs at a pH of over 3.5, more specifically at a pH of 3.7-4.2. Moore

teaches the removal of copper with an ion exchanger at a pH of 4.0 (column 4 lines 2-3).

It would have been obvious to one of ordinary skill in the art at the time of invention to remove copper at a pH of 4.0 using an ion exchanger as taught by Moore in the process of Stewart modified by Jay, Wolf, and Fischer. The motivation for doing so would be that it would produce the same predictable result as the process taught by Stewart Modified by Jay, Wolf, and Fischer, specifically removal of copper from zinc sulfate.

**18. Claims 12,15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay as applied to claims 1, 4, 10-11, 13-14, 17 above, and further in view of US 4005174 to Bodson (hereinafter referred to as Bodson).**

Neither Stewart nor Jay teach chloride removal at a temperature of no more than 45 °C, or converting copper chloride with alkali back to cuprous oxide which is at least partially routed back to chloride removal, or that part of the raw solution is routed to cuprous oxide precipitation, where the copper in the solution is made to react with zinc powder to form cuprous oxide, and the  $\text{Cu}_2\text{O}$  generated is routed to the chloride removal stage.

Bodson teaches a method of removing copper and chloride from a zinc sulfate solution wherein the chloride removal occurs at a temperature of 40 °C (column 5 line 49), and copper oxide is generated both by converting copper chloride with NaOH back to cuprous oxide and by precipitating copper with zinc powder, and routing the copper oxide back to the chlorine removal stage (see the only figure in the patent).

It would have been obvious to one of ordinary skill in the art at the time of invention to remove chloride at a temperature of 40 °C and recycle  $\text{Cu}_2\text{O}$  generated by precipitating copper with zinc powder and converting  $\text{CuCl}$  with  $\text{NaOH}$  as taught by Bodson in the process of Stewart modified by Jay. The motivation for doing so would be that it would result in a more economical process than the process taught by Stewart and modified by Jay.

**19. Claims 18-20, 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay as applied to claims 1, 4, 10-11, 13-14, 17 above, and further in view of Fischer, Wolf, Moore, and Bodson.**

Instant claim 18 is a composite of the instant limitations of claims 1, 3, 11, 12, 13, and 14. The further limitations of instant claims 19, 20, 22, 23, 24, 25, 26, 27, and 28 correspond to the further limitations of instant claims 15, 16, 4, 17, 6, 7, 8, 9, and 10, respectively. See the reasoning listed above for instant claims 1, 3-4, 6-13, 15-17 for why instant claims 18-20, 22-28 are obvious.

**20. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Jay, Fischer, Wolf, Moore, and Bodson as applied to claims 18-20, 22-28 above, and further in view of Bradshaw.**

The further limitation of claim 21 corresponds to the further limitation of instant claim 2. See the reasoning listed above for instant claim 2 for why instant claim 21 is obvious.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Walck whose telephone number is (571)270-5905. The examiner can normally be reached on Monday-Thursday 8 AM-6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Brian Walck/  
Examiner, Art Unit 4181  
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